

Optimum Margin for PLN to Implement Energy Transition Based on RUPTL in Order to Maintain Financial Sustainability

Yehuda Bayu Kristiawan*, Sylviana Maya Damayanti

Institut Teknologi Bandung, Indonesia

Email: yehuda.bayu@plne.co.id

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Abstract

The implementation of Indonesia's Electricity Supply Business Plan (RUPTL) 2025–2034 demands substantial investment to expand infrastructure and accelerate the national energy transition, while PT PLN (Persero) must simultaneously maintain affordable tariffs, financial covenant compliance, and long-term financing capacity under a cost-plus revenue model with an existing Public Service Obligation (PSO) margin of approximately 7%. This creates a strategic financing challenge, as the current margin may be insufficient to fund the planned investment program without increasing PLN's leverage or reliance on government support. This research aims to determine the minimum standalone PSO margin, assess the trade-off between margin adjustment and Penyertaan Modal Negara (PMN), and estimate PLN's executable direct investment capacity if the existing margin is maintained without additional PMN. Using a quantitative approach based on deterministic financial projections and scenario analysis, the study draws on secondary data including RUPTL projections, audited financial statements, and macroeconomic assumptions, evaluated through indicators such as Debt Service Coverage Ratio, Debt-to-EBITDA, interest-bearing debt, and funding gap, with tariffs held fixed. Results show the existing 7% margin without PMN is inadequate, causing PLN's leverage and debt-service capacity to breach acceptable thresholds. A 10% margin is identified as the minimum standalone level enabling financial sustainability without additional PMN. Higher margins reduce dependence on PMN, which is less predictable due to fiscal and political-budgetary factors. Without added PMN, PLN can execute about 87% of its direct CAPEX plan by shifting select projects to IPP financing and re-profiling disbursement schedules, though this reduces PLN's direct investment role.

INTRODUCTION

The recently launched *Rencana Usaha Penyediaan Tenaga Listrik* (RUPTL) 2025–2034 aims to support Indonesia's economic growth and prosperity by increasing electricity supply while facilitating the energy transition (Kementerian ESDM, 2025). It aligns with three national agendas—economic growth, energy security, and environmental sustainability (Massagony et al., 2025)—through several key priorities: increasing electricity supply by 69% by 2034 (an average increase of 24 TWh per year), ensuring that 76% of new capacity comes from renewable energy sources (including 43 GW of renewable energy generation capacity and 10 GW of energy storage), and avoiding approximately 151 MtCO_{2e} of annual emissions by

2030 under the ARED scenario compared with the business-as-usual (BAU) scenario (Kementerian ESDM, 2025). The RUPTL 2025–2034 represents a pivotal step in aligning Indonesia's development objectives with its energy transition ambitions (Handayani et al., 2022). Several key leaders have expressed support for its implementation: the Minister of Energy and Mineral Resources, Bahlil Lahadalia, has emphasized the role of the RUPTL as a strategic guideline for electricity development; the Minister of State-Owned Enterprises, Erick Thohir, has highlighted the importance of transitioning toward cleaner energy for future generations; and Danantara CEO Rosan Roeslani has stressed the need for integrated cross-state-owned enterprise (*Badan Usaha Milik Negara* [BUMN]) collaboration to support economic growth and energy security (Apriliyanti et al., 2024). However, these ambitious targets raise a critical question regarding whether the state-owned electricity utility has sufficient financial capacity to achieve them (Halimatussadiah et al., 2024; Maulidia et al., 2019).

Indonesia's electricity sector plays a fundamental role in supporting economic activity, energy security, and environmental objectives. Increasing electricity demand requires the power system to provide reliable and affordable electricity while simultaneously advancing the national energy transition agenda. PT PLN (Persero), as the state-owned electricity utility, therefore carries the primary responsibility for maintaining electricity access, availability, and system reliability throughout the country. Consequently, the successful implementation of national electricity development programs and energy transition targets depends partly on PLN's capacity to finance the required investments (Afriani & Poletti, 2026; Irfan & Rambey, 2024; Kurniawan et al., 2024; Setyowati, 2020; Tampubolon et al., 2025).

Indonesia's electricity industry is currently entering a new phase through the implementation of the RUPTL 2025–2034. This electricity supply development plan aims to support national growth by increasing electricity supply by approximately 69% by 2034, adding around 70 GW of generation capacity, developing approximately 47,800 km of transmission infrastructure, and accelerating renewable energy deployment. Around 76% of additional generation capacity is expected to originate from renewable energy and storage technologies, while the renewable energy share in the electricity mix is projected to increase substantially throughout the planning period (Bhuiyan, 2022; Obiora et al., 2024; Scarlat et al., 2015; Zou et al., 2017; Zsiborács et al., 2019). Furthermore, the implementation of the RUPTL is expected to contribute to emissions reductions, with avoided emissions estimated at approximately 151 MtCO_{2e} annually by 2030 compared with the business-as-usual scenario.

This condition creates a strategic challenge for PLN. Although PLN has demonstrated improvements in its historical operational and financial performance, the future investment requirements under the RUPTL may place additional pressure on the company's financial sustainability (Apriliyanti et al., 2024; Halimatussadiah et al., 2024). Historically, PLN increased electricity generation from 275 TWh in 2020 to 344 TWh in 2024 (PT PLN (Persero), 2025) while improving system reliability, as reflected in the decline of the System Average Interruption Duration Index (SAIDI) from approximately 13 hours per customer per year to around 5 hours per customer per year (Kunaifi & Reinders, 2018; PT PLN (Persero), 2025). PLN also maintained compliance with key financial covenants, with its Debt-to-EBITDA ratio improving from 5.2 to 3.8 and its Debt Service Coverage Ratio (DSCR) remaining above the minimum threshold (PT PLN (Persero), 2025). However, PLN's return on assets (ROA)

remained relatively low at approximately 1%, indicating limited profitability compared with several regional and global electricity utility peers (Massagony et al., 2025; Wong & Dewayanti, 2024).

The challenge is not only related to PLN's corporate financial position but also to broader fiscal and socioeconomic implications. If electricity tariffs remain below their economically justified levels while investment and operational costs continue to increase, the government's subsidy and compensation burden may also rise. Under the business-as-usual scenario, where no adjustment is made to tariffs or PLN's business margin, electricity subsidies and compensation are projected to increase from approximately Rp204.3 trillion in 2025 to around Rp297.2 trillion in 2034. This indicates that maintaining the existing policy structure without adjustments may create long-term fiscal pressure for the government. At the same time, any margin adjustment and government support mechanism must be carefully designed because PLN operates both as a corporate entity and as an instrument for fulfilling public service obligations. Therefore, the key challenge is to design a balanced margin adjustment and government support mechanism that strengthens PLN's financial capacity while maintaining fiscal sustainability and policy acceptability.

METHOD

This chapter explained the research procedures used to answer the research questions formulated in Chapter I. The discussion covered the research design, data collection methods, and data analysis techniques. The research design was structured to determine the optimum business margin and government support required for PLN to implement the Rencana Usaha Penyediaan Tenaga Listrik (RUPTL) while maintaining financial sustainability and supporting the energy transition.

Research Design

This study applies a quantitative approach to determine whether the current profit margin and government support applied by the Government could fulfill PLN's requirements for electricity supply sustainability. The advantages, disadvantages, and reliability of this instrument were also part of the objectives. In order to answer these research goals, the research aims to obtain a view of the financial condition and projection in line with this topic. Data gathered from this research instrument were then computed for interpretation and projection. Along with primary data, the researcher also made use of secondary resources in the form of published articles and literature to support the computation results. The figure below depicts the

RESULTS AND DISCUSSION

Analysis

Analysis of Baseline Financial Projection

This subchapter presents the results of PLN's baseline financial projection under the prevailing condition, i.e., a fixed 7% PSO business margin with no additional government support (Penyertaan Modal Negara/PMN), consistent with PT PLN (Persero)'s own RUPTL 2025-2034 financial projection scenario referred to as the "Existing Condition" scenario (PT PLN (Persero), 2025).

The first step is to prepare baseline financial projections, assuming a fixed cost-plus margin of 7%, as currently applied. The projections cover the period 2025-2034, in line with the RUPTL horizon, and produce a series of pro forma financial statements to assess PLN's internal capacity to finance energy transition investment needs.

Within the framework of cash flow and financial planning theory, the analysis looks beyond the profit shown in the income statement and also emphasizes: Operating cash flow (OCF), a measure of PLN's operational ability to generate cash from regular business activities; and Free cash flow (FCF), the cash remaining after all fixed-asset investment and working capital requirements are met. This ultimately determines PLN's financing capacity and ability to maintain a healthy capital structure.

The baseline projection results indicate that with a 7% margin, PLN is relatively capable of maintaining leverage (Debt-to-EBITDA) and DSCR within a range close to internal thresholds and creditor covenants, in line with historical performance in 2020-2024. However, the internal fiscal space to finance investments needed — Rp2,699 trillion according to the RUPTL — is limited, especially for investment clusters that are commercially less viable, such as distribution, transmission, and LISDES (remote electricity).

Table 1. Baseline Financial Projection — Existing Condition (Margin PSO 7%, without PMN), 2025–2034

Indicator	Threshold	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
DSCR (x)	min 1.5x	1.45	1.46	1.44	1.71	1.77	1.73	1.87	1.90	1.81	1.72
Debt to EBITDA (x)	max 5x	4.52	5.08	4.99	4.79	4.81	5.02	4.88	4.62	4.45	4.32
Interest Bearing Debt (Rp T)	–	460.45	570.07	631.66	660.05	690.16	745.18	772.48	761.51	753.98	742.03
Gap Funding (Rp T)	–	88.4	133.3	103.8	63.0	69.2	100.2	69.5	33.9	45.0	48.6

As shown in Table 1, under the Existing Condition scenario PLN's Debt-to-EBITDA ratio breaches the internal ceiling of 5x as early as 2026 (5.08x) and again in 2030 (5.02x), while the DSCR falls below the minimum covenant of 1.5x in 2025 and 2026. The cumulative funding gap that cannot be covered by internal funds and committed loans over 2025–2034 reaches Rp754.9 trillion. This confirms PT PLN (Persero)'s own conclusion that, without an adjustment to the business margin and/or PMN support, PLN's financial condition under the current 7% margin scenario is not financially sustainable (PT PLN (Persero), 2025).

Analysis of Optimum Margin and Government Support

Building on the baseline projection above, seven margin-PMN combinations previously simulated by PT PLN (Persero) (2025) are compared in Table 2, evaluated against the cumulative funding gap, DSCR, Debt/EBITDA, and compliance with Law No. 19/2003 on State-Owned Enterprises.

Table 2. Margin PSO vs. Government Support (PMN), 2025–2034

Scenario	Margin PSO	PMN (Rp T)	Cum. Funding Gap (Rp T)	DSCR min (x)	Debt/EBITDA max (x)	Compliance Law 19/2003	Financial Status
Existing	7%	0	754.9	1.44	5.08	Not compliant	Not healthy
Alt 1	7%	240	453.9	1.50	4.57	Compliant	Healthy
Alt 2	8%	0	691.5	1.49	4.76	Not compliant	Not healthy
Alt 3	8%	160	496.7	1.50	4.47	Compliant	Healthy
Alt 4	9%	0	628.1	1.55	4.47	Not compliant	Healthy, non-compliant
Alt 5	9%	80	529.9	1.56	4.33	Compliant	Healthy
Alt 6	10%	0	565.2	1.62	4.21	Compliant	Healthy

Table 2 shows two broad relationships. First, the margin-only alternatives (Alt 2, Alt 4, and Alt 6) produce progressively stronger DSCR and Debt-to-EBITDA results as the margin rises; however, only the 10% margin reaches the required financial and internal compliance conditions without PMN. Second, margins below 10% require PMN to restore DSCR to at least 1.5x and Debt-to-EBITDA to no more than 5x: Rp240 trillion at 7%, Rp160 trillion at 8%, and Rp80 trillion at 9%. Alt 4, which combines a 9% margin with no PMN, meets the financial thresholds with DSCR of 1.55x and Debt-to-EBITDA of 4.47x but remains classified as non-compliant in PLN's internal model. Because the available model output does not specify the legal basis for this classification, it is treated in this research as an internal model compliance status rather than an independent legal conclusion. A feasible scenario must therefore satisfy both the financial thresholds and the model's compliance classification.

Trade-Off Analysis between Margin and PMN

Restricting the seven scenarios in Table 2 to those that simultaneously satisfy $DSCR \geq 1.5x$, $Debt/EBITDA \leq 5x$, and compliance with Law No. 19/2003 (Alt 1, Alt 3, Alt 5, and Alt 6) produces an efficient frontier that directly answers RQ2, as shown in Table 3.

Table 3. Efficient Frontier: Margin vs. PMN Required for a Healthy and Compliant Financial Position

Margin PSO	PMN required (Rp T)
7%	240
8%	160
9%	80
10%	0

This linear trade-off implies that, for every one-percentage-point increase in the PSO business margin, the amount of PMN required to keep PLN financially healthy and compliant decreases by approximately Rp80 trillion. In other words, policymakers can substitute a margin adjustment for a direct capital injection at an approximate exchange rate of Rp80 trillion of PMN per one percentage point of margin, giving the government and PLN's Board of Directors flexibility to select the combination that is most feasible given the fiscal space available in a

given budget year, rather than being limited to a single scenario.

Executable PLN Investment Capacity without PSO Margin Adjustment and PMN Support

This subchapter presents the results and analysis of the margin and government-support scenario simulations that combine various PSO margin levels with different levels of PMN support, complementing the quantitative matrix in Table 2.

Beyond the funding-gap comparison in the preceding subsection, PT PLN (Persero)'s internal CAPEX-optimization simulation directly quantifies the amount of RUPTL 2025–2034 investment that can still be carried on PLN's own balance sheet if the PSO business margin remains at 7% and no additional PMN support is provided. This analysis completes the answer to RQ3 and Objective 3 by estimating PLN's executable direct CAPEX capacity under the no-additional-support scenario.

The simulation shows that executing the full PLN direct CAPEX plan of approximately Rp1,400.7 trillion under the 7% margin and no-PMN scenario would breach the minimum financial sustainability thresholds. Under the original plan, DSCR falls to 1.44x and Debt-to-EBITDA reaches 5.08x, indicating that the original RUPTL investment structure is not financially sustainable for PLN without additional support.

To restore financial sustainability while maintaining the 7% PSO margin and without receiving PMN, PLN needs to apply two optimization levers. First, part of the generation investment originally planned to be carried by PLN is shifted to Independent Power Producers (IPP). Under this optimization, PLN's generation portion decreases from 20.4 GW (29%) to 13.7 GW (20%), while the IPP portion increases from 49.1 GW (71%) to 55.8 GW (80%). This shift represents approximately 6.72 GW of generation capacity, consisting mainly of solar, hydro, and wind projects. Second, PLN re-profiles the CAPEX disbursement schedule to improve cash flow timing and reduce pressure on financial covenants.

As shown in Table 4, the optimized scenario reduces PLN's direct CAPEX burden from Rp1,400.7 trillion to approximately Rp1,222.7 trillion. This means that, without a PSO margin adjustment and without PMN support, PLN can carry approximately 87.3% of the original direct CAPEX plan on its own balance sheet while maintaining DSCR and Debt-to-EBITDA within acceptable thresholds. The remaining approximately Rp178 trillion is not cancelled from the RUPTL program, but must be shifted from PLN financing to IPP financing.

Table 4. Executable Investment Capacity at 7% Margin without PMN, 2025–2034

Scenario	PLN Direct CAPEX (Rp T)	Gap Funding (Rp T)	DSCR min (x)	Debt/EBITDA max (x)	Financial Status
Original RUPTL plan (as planned, no optimization)	1,400.7	754.9	1.44	5.08	Not healthy — not executable as planned
Optimized: PLN–IPP portion shift only	1,222.7	577.1	1.50	4.83	Healthy (marginal)
Optimized: PLN–IPP shift + disbursement re-profiling	1,222.7	550.3	1.50	4.55	Healthy

Therefore, under the no-additional-support scenario, PLN's maximum executable direct

CAPEX is approximately Rp1,222.7 trillion, equivalent to 87.3% of the original PLN direct CAPEX requirement of Rp1,400.7 trillion. The remaining Rp177–178 trillion must be reallocated to IPP financing to keep PLN financially healthy.

Pros and Cons Analysis of Margin Adjustment and PMN Support

In addition to the quantitative comparison of financial indicators, the alternative scenarios were evaluated based on their main advantages and disadvantages. This assessment considers financial sustainability, funding predictability, institutional approval requirements, fiscal implications, investment-planning certainty, and PLN's strategic role in implementing RUPTL 2025–2034.

Table 5. Pros and Cons Analysis of Margin Adjustment and PMN Support

Alternative	Pros	Cons	Analytical Implication
10% PSO margin without additional PMN	Maintains PLN's key financial indicators within acceptable thresholds without requiring additional PMN. Provides a recurring and relatively predictable revenue basis. Supports long-term RUPTL investment planning. Reduces dependence on repeated government capital injections. Allows PLN to maintain a larger direct financing and ownership role in the investment program.	Requires an initial policy and regulatory approval process. May increase subsidy and compensation requirements because electricity tariffs remain fixed. Requires a transparent allowable-cost and margin-calculation mechanism. May create additional pressure on the government's recurring fiscal expenditure.	This alternative provides the strongest funding certainty and the most structural solution for PLN's financial sustainability, although its fiscal implications must be managed transparently.
9% PSO margin with approximately Rp80 trillion PMN	Maintains PLN's financial health while requiring a smaller increase in the PSO margin. Needs less PMN than the alternatives based on 7% or 8% margins. Shares the financing requirement between recurring margin revenue and government equity support. Can function as a practical transition toward the standalone 10% margin.	Implementation still depends on the approval and disbursement of PMN. Creates uncertainty regarding the amount and timing of funding. Requires internal project review, business and governance-risk-compliance assessments, Board approval, Board of Commissioners' consideration, BPKP review, ministerial evaluation, and approval through the state-budget process. Continuity of support is not automatically guaranteed.	This alternative may serve as a transitional solution, but its implementation certainty is lower than that of the standalone 10% margin scenario.
8% PSO margin with approximately	Limits the increase in the PSO margin. Meets the financial	Requires a relatively large PMN allocation. Increases dependence on	The scenario is financially workable, but it

Rp160 PMN	trillion	sustainability thresholds provided that the full PMN requirement is approved and disbursed. Enables government capital support to be directed toward selected strategic projects.	government fiscal capacity. Has greater exposure to annual budget priorities and approval processes. A reduction or delay in PMN could postpone investment execution.	carries more fiscal dependence and implementation risk than the 9% and 10% alternatives.
7% PSO margin with approximately Rp240 PMN	trillion	Maintains the existing margin structure. Avoids an immediate margin-policy adjustment. Allows PMN to be allocated to strategic and non-commercial infrastructure.	Requires the largest PMN allocation. Creates the highest dependence on government capital support. Exposes the investment program to fiscal-space constraints, institutional review, parliamentary discussion, and annual APBN approval. Provides the lowest long-term funding predictability among the financially sustainable scenarios.	Although financially feasible if the full PMN is realized, this alternative has the highest institutional and budgetary uncertainty.
7% PSO margin without PMN, with CAPEX optimization		Does not require a margin increase or additional PMN. Maintains minimum financial sustainability through CAPEX reallocation and disbursement re-profiling. Reduces balance-sheet and debt pressure on PLN.	PLN can execute only approximately 87.3% of its original direct CAPEX plan. Selected generation projects must be transferred to Independent Power Producers. Reduces PLN's direct ownership and investment role. Increases dependence on future purchased-power arrangements. Does not structurally strengthen PLN's recurring financial capacity.	This alternative should be treated as a contingency measure rather than the preferred long-term solution.

The pros and cons analysis indicates that each alternative involves a different balance between PLN's financial sustainability, government fiscal exposure, and implementation certainty. Lower-margin alternatives supported by PMN can maintain PLN's financial health, but their realization depends on the completion of a multi-stage institutional and budgetary process. PLN's PMN business process includes project verification, preparation of business and governance-risk-compliance assessments, approval by the Board of Directors, consideration by the Board of Commissioners, BPKP review, evaluation by the Ministry of State-Owned Enterprises and the Ministry of Finance, parliamentary discussion, and incorporation into the State Budget. These stages strengthen governance and accountability but also create uncertainty regarding the amount, timing, and continuity of PMN funding.

A standalone 10% margin is not without cost, particularly because the fixed-tariff assumption may translate the additional revenue requirement into higher subsidy and

compensation expenditure. Once approved, however, the margin becomes part of a recurring revenue mechanism that can be incorporated into multi-year financial planning. It does not require PLN to repeat a project-specific equity proposal and pass through the annual political-budgetary process for the same structural financing need. Among the alternatives tested, the 10% PSO margin therefore offers the strongest combination of financial sustainability, planning certainty, and implementability.

Accordingly, the 10% PSO margin is identified as the preferred standalone solution, while the 9% margin combined with approximately Rp80 trillion of PMN may be retained as a transitional alternative. Lower-margin alternatives with larger PMN requirements involve greater implementation uncertainty, whereas CAPEX optimization under the existing 7% margin should be used only as a contingency measure when neither margin adjustment nor additional PMN is available.

CONCLUSION

This research examined the PSO business margin and government support required for PLN to implement the *Rencana Usaha Penyediaan Tenaga Listrik* (RUPTL) 2025–2034 while maintaining long-term corporate financial sustainability. The conclusions were structured according to the three research questions formulated in Chapter I. Regarding the first research question, the existing 7% PSO business margin without additional *Penyertaan Modal Negara* (PMN) was found to be insufficient to support the full implementation of the RUPTL 2025–2034 while maintaining PLN's financial sustainability. Under this scenario, the minimum Debt Service Coverage Ratio (DSCR) declined to 1.44x, below the minimum threshold of 1.50x, while the maximum Debt-to-EBITDA ratio increased to 5.08x, exceeding the maximum threshold of 5.00x. In addition, the cumulative funding gap reached approximately Rp754.9 trillion. Among the scenarios evaluated, a 10% PSO business margin was identified as the minimum standalone margin capable of maintaining PLN's key financial indicators within acceptable thresholds without additional PMN, with a minimum DSCR of 1.62x and a maximum Debt-to-EBITDA ratio of 4.21x. Therefore, the 10% margin was concluded to represent the preferred standalone scenario within the assumptions and alternatives examined in this research.

Regarding the second research question, PMN was found to be capable of substituting for or complementing a lower PSO business margin, as demonstrated by the financially sustainable combinations of a 7% margin with approximately Rp240 trillion of PMN, an 8% margin with approximately Rp160 trillion of PMN, a 9% margin with approximately Rp80 trillion of PMN, and a 10% margin without additional PMN. These scenarios indicated an approximate trade-off in which each one-percentage-point increase in the PSO margin reduced the required PMN by approximately Rp80 trillion within the financial projection framework used in this study. Although lower-margin scenarios supported by PMN could maintain PLN's financial sustainability, the 10% standalone margin provided a more predictable and recurring financial basis for long-term investment planning. Meanwhile, PMN remained dependent on fiscal availability, government priorities, and the government budgetary approval process.

Finally, concerning the third research question, maintaining the existing 7% PSO margin without additional PMN would prevent PLN from fully executing the original direct CAPEX plan of approximately Rp1,400.7 trillion solely through its balance sheet while maintaining

acceptable financial indicators. Through the reallocation of selected generation projects to Independent Power Producer (IPP) financing and the rescheduling of CAPEX disbursement, PLN could execute approximately Rp1,222.7 trillion, equivalent to 87.3% of the original direct CAPEX plan. The remaining investment requirement of approximately Rp177–178 trillion would need to be shifted to IPP financing. This optimization improved the minimum DSCR to 1.50x, reduced the maximum Debt-to-EBITDA ratio to approximately 4.55x, and decreased the cumulative funding gap from Rp754.9 trillion to approximately Rp550.3 trillion. However, because this approach reduced PLN's direct investment role and increased reliance on IPPs, it should be considered a contingency measure rather than the preferred long-term financing strategy.

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